CLAIMS

1. A track lighting apparatus, comprising:

an essentially rigid linear or curvilinear-shaped housing;

at least one pair of essentially rigid electrically conductive tracks mechanically coupled to the housing and configured to provide power and data to a plurality of lighting fixtures when the fixtures are coupled to the at least one pair of electrically conductive tracks; and

at least one LED-based lighting fixture mechanically coupled to the housing, electrically coupled to the at least one pair of electrically conductive tracks, and configured to be responsive to the data.

2. The apparatus of claim 1, wherein the apparatus is configured such that the at least one LED-based lighting fixture is detachably coupled to the housing and the at least one pair of electrically conductive tracks, and movable along a length of the housing.

3. The apparatus of claim 1, wherein the at least one pair of electrically conductive tracks are configured to provide the power and the data in parallel to the plurality of lighting fixtures.

4. The apparatus of claim 1, wherein the at least one LED-based lighting fixture is configured to process at least the data so as to control at least one of an intensity of radiation generated by the at least one fixture, a color of the generated radiation, a focus of the generated radiation, and a movement of the at least one LED-based lighting fixture.

5. The apparatus of claim 4, further comprising at least one controller coupled to the at least one pair of electrically conductive tracks and configured to control the at least one LED-based lighting fixture, based at least in part on the data, using a pulse width modulation technique.

6. The apparatus of claim 1, wherein:

the at least one LED-based lighting fixture is configured to output at least first radiation having a first wavelength and second radiation having a second wavelength; and

the apparatus further comprises at least one controller coupled to the at least one pair of electrically conductive tracks and configured to independently control at least a first intensity of the first radiation and a second intensity of the second radiation output by the at least one LED-based lighting fixture based at least in part on the data.

7. The apparatus of claim 6, wherein the at least one controller is configured to independently control at least the first intensity of the first radiation and the second intensity of the second radiation output by the at least one LED-based lighting fixture using a pulse width modulation technique.

8. The apparatus of claim 1, further including a controlled waveshape driver coupled to the at least one pair of electrically conductive tracks and configured to reduce radio frequency radiation from the apparatus.

9. The apparatus of claim 1, wherein the at least one pair of electrically conductive tracks includes only one pair of electrically conductive tracks to provide both the power and the data in parallel to the plurality of lighting fixtures.

10. The apparatus of claim 1, wherein the at least one pair of electrically conductive tracks includes at least a first track to provide the power to the plurality of lighting fixtures and at least a second track to provide the data to the plurality of lighting fixtures.

11. The apparatus of claim 1, wherein the at least one pair of electrically conductive tracks is mechanically coupled to the housing via at least one electrical insulator.

12. The apparatus of claim 11, wherein the housing is metallic.

13. The apparatus of claim 12, wherein the housing includes an extruded aluminum track.

14. The apparatus of claim 13, wherein the at least one pair of electrically conductive tracks includes at least two copper conductors, and wherein the at least one insulator includes at least one extruded plastic insulator configured to support the at least two copper conductors.

15. The apparatus of claim 1, wherein the at least one pair of electrically conductive tracks includes a controlled impedance medium.

16. The apparatus of claim 15, wherein at least one electrically conductive track of the at least one pair is configured to have a resistance per unit length less than that needed to deliver 1.5 volts of signal to each of the plurality of lighting fixtures.

17. The apparatus of claim 15, wherein at least one electrically conductive track of the at least one pair is configured to have a resistance per unit length of approximately 0.09 ohms per foot.

18. The apparatus of claim 1, further including at least one termination coupled to the at least one pair of electrically conductive tracks and configured to compensate at least in part for an inductive effect of the at least one pair of electrically conductive tracks.

19. The apparatus of claim 18, wherein the at least one termination is configured to compensate at least in part for the inductive effect of the at least one pair of electrically conductive tracks without constantly drawing power from a signal providing the data.

20. The apparatus of claim 1, further comprising at least one termination coupled to the at least one pair of electrically conductive tracks and configured to clamp a voltage of a signal providing the data to a maximum of approximately +5 volts and a minimum of approximately -5 volts.

21. The apparatus of claim 1, further comprising at least one termination coupled to the at least one pair of electrically conductive tracks and configured to absorb energy that would otherwise be reflected on the at least one pair of electrically conductive tracks.

22. The apparatus of claim 21, wherein the at least one termination is configured to absorb approximately 95% of the energy that would otherwise be reflected on the at least one pair of electrically conductive tracks.

23. A track lighting method, comprising an act of:

A) providing power and data to a plurality of lighting fixtures via at least one pair of essentially rigid electrically conductive tracks that are mechanically coupled to an essentially rigid linear or curvilinear-shaped housing, the plurality of lighting fixtures including at least one LED-based lighting fixture mechanically coupled to the housing, electrically coupled to the at least one pair of electrically conductive tracks, and configured to be responsive to the data.

24. The track lighting method of claim 23, wherein the act A) includes an act of:

providing the power and the data in parallel to the plurality of lighting fixtures via the at least one pair of essentially rigid electrically conductive tracks.

25. The method of claim 23, wherein the act A) includes an act of:

processing at least the data so as to control at least one of an intensity of radiation generated by the at least one LED-based lighting fixture, a color of the generated radiation, a focus of the generated radiation, and a movement of the at least one LED-based lighting fixture.

26. The method of claim 23, wherein the act A) includes an act of:

processing at least the data so as to control the at least one LED-based lighting fixture using a pulse width modulation technique.

27. The method of claim 23, wherein the at least one LED-based lighting fixture is configured to output at least first radiation having a first wavelength and second radiation having a second wavelength, and wherein the act A) includes an act of:

B) providing at least the data so as to independently control at least a first intensity of the first radiation and a second intensity of the second radiation output by the at least one LED-based lighting fixture.

28. The method of claim 27, further comprising an act of:

C) processing the data so as to independently control at least the first intensity of the first radiation and the second intensity of the second radiation output by the at least one LED-based lighting fixture using a pulse width modulation technique.

29. The method of claim 23, further comprising an act of:

conditioning at least one signal on the at least one pair of electrically conductive tracks so as to reduce radio frequency radiation from the apparatus.

30. The method of claim 23, wherein the at least one pair of electrically conductive tracks includes only one pair of electrically conductive tracks, and wherein the act A) includes an act of:

providing both the power and the data in parallel to the plurality of lighting fixtures only via the one pair of electrically conductive tracks.

31. The method of claim 23, wherein the at least one pair of electrically conductive tracks includes at least a first track and a second track, and wherein the act A) includes acts of:

providing the power to the plurality of lighting fixtures via at least the first track; and

providing the data to the plurality of lighting fixtures via at least the second track.

32. The method of claim 23, wherein the at least one pair of electrically conductive tracks is mechanically coupled to the housing via at least one electrical insulator.

33. The method of claim 32, wherein the housing includes an extruded aluminum track.

34. The method of claim 33, wherein the at least one pair of electrically conductive tracks includes at least two copper conductors, and wherein the at least one insulator includes at least one extruded plastic insulator configured to support the at least two copper conductors.

35. The method of claim 23, wherein the at least one pair of electrically conductive tracks includes a controlled impedance medium.

36. The method of claim 35, wherein at least one electrically conductive track of the at least one pair is configured to have a resistance per unit length less than that needed to deliver 1.5 volts of signal to each of the plurality of lighting fixtures.

37. The method of claim 35, wherein at least one electrically conductive track of the at least one pair is configured to have a resistance per unit length of approximately 0.09 ohms per foot.

38. The method of claim 23, further comprising an act of:

B) compensating a signal providing the data at least in part for an inductive effect of the at least one pair of electrically conductive tracks.

39. The method of claim 38, wherein the act B) further comprises an act of:

compensating the signal providing the data at least in part for the inductive effect of the at least one pair of electrically conductive tracks without constantly drawing power from the signal providing the data.

40. The method of claim 23, further comprising an act of:

B) clamping a voltage of a signal providing the data to a maximum of approximately +5 volts and a minimum of approximately -5 volts.

41. The method of claim 23, further comprising an act of:

B) conditioning at least one signal providing the data so as to reduce distortion of the at least one signal by absorbing energy that would otherwise be reflected on the at least one pair of electrically conductive tracks.

42. The method of claim 41, wherein the act B) includes an act of:

conditioning the at least one signal providing the data so as to reduce the distortion of the at least one signal by absorbing approximately 95% of the energy that would otherwise be reflected on the at least one pair of electrically conductive tracks.